Title: What Does It Take to Field a Soccer Team?

Brief Overview:

Students will determine the costs of materials and equipment needed to field a soccer team and write a budget. Students will use concepts of linear and area measurement to determine whether a given region can contain the field. Students will create a scale drawing using ratio and proportion. Students will write a proposal containing a scale drawing and budget to be presented to the School Board.

Link to Standards:

- **Problem Solving** Students will demonstrate their ability to solve mathematical problems by deciding which information is pertinent to their particular task.
- **Communication** Students will demonstrate their ability to communicate mathematically by writing a letter and proposal explaining their budgetary requirements.
- **Reasoning** Students will demonstrate their ability to make decisions about which materials and equipment to purchase based on calculations and budget limitations.
- **Connections** Students will demonstrate their ability to apply math skills to economics and use letter writing skills.
- **Number & Number Relationships** Students will demonstrate their ability to use ratio and proportion in the construction of a scale model diagram. They also will demonstrate the ability to calculate using fractions and decimals.
- **Geometry/ Measurement** Students will demonstrate their ability to calculate perimeter and area and convert units within the customary system of measurement. They will demonstrate their ability to recognize whole and parts of geometric shapes embedded in a diagram and apply concepts of linear and area measurement; they also will demonstrate their ability to determine whether a geometric shape can contain another and which dimension, area or perimeter, is more important.

Grade/Level:

Grades 7-8.

Duration/Length:

This activity should take 5 days including the assessment. The activities may take longer then anticipated depending on class duration and student's prior knowledge.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Calculating perimeter and area of various geometric shapes
- Converting units of measure
- Using ratio and proportion

- Using operations with fractions and decimals
- Estimating
- Writing a business letter

Objectives:

Students will:

- work cooperatively in groups.
- analyze data in a table.
- make decisions based on budgetary constraints.
- make a scale drawing.
- make accurate calculations using appropriate units.
- submit a proposal with worksheets and a business letter.

Materials/Resources/Printed Materials:

- Pencils
- Paper
- Rulers
- School stationary facsimile
- Calculators
- Statement of Problem sheet
- Student Worksheets 1-4
- Extension Activity sheet
- Culminating Activity sheet

Development/Procedures:

Day 1:

- Present the problem to the class. Allow them enough time to clarify any questions they may have.

- Organize the class into groups of 3 or 4. Pass out Worksheet 1. Explain that all of the decision making should be concluded by the end of the class period. Students need to complete the calculations for homework. Remind students that they may not mix individual pieces of equipment, i.e. all soccer balls must be same brand.

Day 2:

- Pass out Worksheet 2. Review directions and the diagram. Discuss how to calculate the perimeter. Either measuring or using a formula is acceptable here. Students should begin working on the calculations in class and compute them for homework, if necessary.

Day 3:

- Discuss ratio and proportion briefly. Pass out Worksheet 3. Students can begin making their drawing and complete it for homework

Day 4:

- Pass out Worksheet 4. Explain to students that they must show all calculations or write an explanation using complete sentences. This sheet should be completed by the end of class.

Day 5:

- Pass out the sheet titled Culminating Activity. Students will write their business letter and organize their packet of information. Students must submit their package by the end of class.

Evaluation:

The evaluation for this activity is based on the packet that students put together to present to the School Board.

Extension/Follow Up:

1. Use the Extension Activity which has students calculate the cost of growing grass on the field. This activity could combine with science if students are asked to grow grass and measure how fast it grows in order to determine when the field would be ready to use.

2. Increase the amount of money from the school board to $5000 and let the students determine how this could best be spent.

3. Ask the students to project what their expenses will be for next year assuming the same number of players and games.

4. Tell the student that the lowest bid will win. Let them brainstorm how they might be able to obtain additional funds and/or materials from the community. Ask them to redo their proposal to reflect these changes.

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Problem

Soccer is the favorite sport at your school and there are some terrific players in your class. You and your classmates have decided that your school needs a soccer team. The principal, Mr. Ghelman, supports this idea but does not have any money left in the school budget for sports. There is $2600 in a fund that the School Committee has set aside for special requests. The school committee is meeting in four days to decide on who will receive the $2600.

You need to determine how much it will cost to create a field and purchase equipment, make a scale drawing of the field, choose the most appropriate plot, and write up the proposal. You must then present your proposal to the school committee. If you miss the deadline, there will be no soccer team. Good luck!!

Worksheet 1
Equipment Costs

You have a total of $2600 to spend on equipment. The following is the necessary equipment needed to start a soccer program:

* 2 goal posts
* 2 goal nets
* 4 soccer balls
* 16 jerseys
* 16 shorts

Goal Posts	Portable Graphite $715 each	Portable Aluminum $605 each	Permanent Steel $525 each
Goal Nets	Nylon Mesh $65 each	Nylon/Polyester $57 each	Chord Mesh $50 each
Soccer Ball	Leather/Latex blend $44 each DIADORA brand	PVC construction $29 each LOTTO brand	Latex bladder $21 each UMBRO brand
Uniform: Jersey	Cotton/ Polyester $51 each ADIDAS brand	Cotton/ Polyester $40 each DIADORA brand	Cotton/ Polyester $49 each NIKE brand
Uniform: Shorts	100% Nylon $20 each ADIDAS brand	100% Nylon $20 each DIADORA brand	100% Nylon $22 each NIKE brand

Worksheet 1-continued
Equipment Costs

Directions: Complete the following calculations. For each piece of equipment, you may select from any of the three choices.

No. of Items x Cost = Subtotal

1) GOAL POSTS:

2) GOAL NETS:

3) UNIFORM; JERSEY:

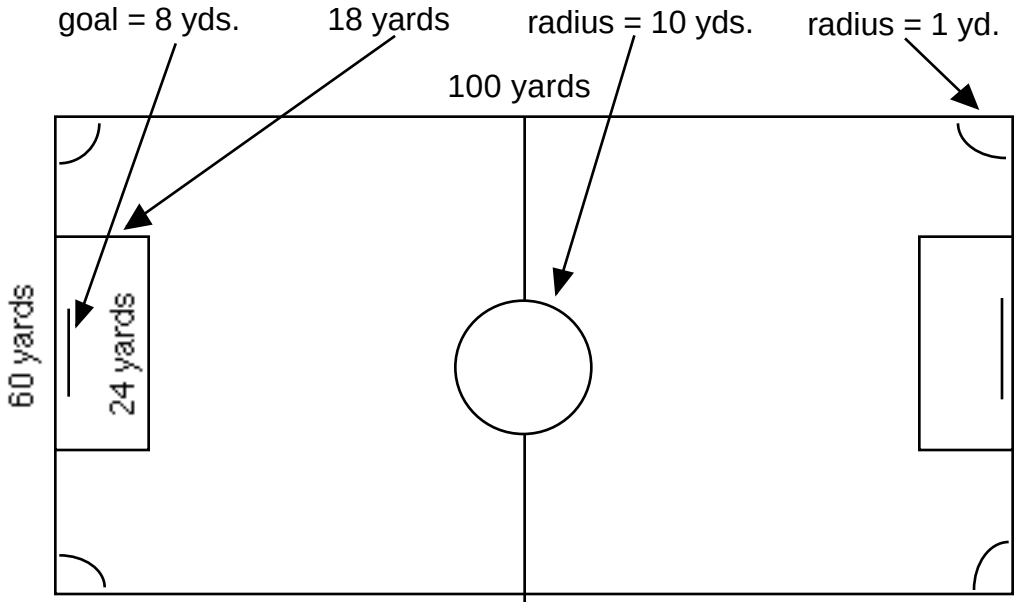
4) UNIFORM; SHORTS:

5) SOCCER BALLS:

TOTAL EQUIPMENT AMOUNT = $_____

Worksheet 2
Calculating Cost to Line the Field

In addition to the cost of soccer equipment, the cost of lime needed to create lines on the field must be taken into account. Lime must be used to make all lines on the field. To determine this cost, refer to the diagram (not drawn to scale) and answer the following questions.



1. Describe how you would determine the perimeter of the rectangular shapes.

2. Write the formula for finding the perimeter (circumference) of a circle. _____

3. Use the formulas and show your work in calculating the total distance of the lines that need to be marked. Label all answers with the appropriate units.

   A. Perimeter of field

   B. Perimeter of two goalie boxes

C. Midfield line

D. Circumference of midfield circle

E. Circumference of corner circles

F. **Total** line distance

4. Now the cost of the lime for a year must be calculated. Assume the following information in determining this expense. Be sure to take into account the conversion between feet and yards. Show all work.

   Lime is sold in 40-lb. bags.
   Each bag can mark approximately 500 ft.
   Each bag of lime costs $2.48
   The field will need to be marked before every game.
   Twenty games are played each year.

5. Now add this expense to the total cost of equipment as found in worksheet 1. Use this figure when writing your proposal. _____

Worksheet 3
Scale Drawing of Soccer Field

In order to create an accurate scale drawing, several considerations must be made. The following questions and activities will help to facilitate the transformation of actual dimensions of a soccer field to a scale drawing.

1. What are the outer dimensions of the soccer field? (Be sure to label as *yds*.)

   length = _____

   width = _____

2. Look at the grid provided on the following page. What are the outer dimensions of the grid? (Label simply as *units*.)

   length = _____

   width = _____

3. In order to scale the dimensions of the field down to fit on the drawing grid, all measurements must be divided proportionately by some number. Examine the lengths and widths of the field and the grid. What is the number needed for this drawing? _____

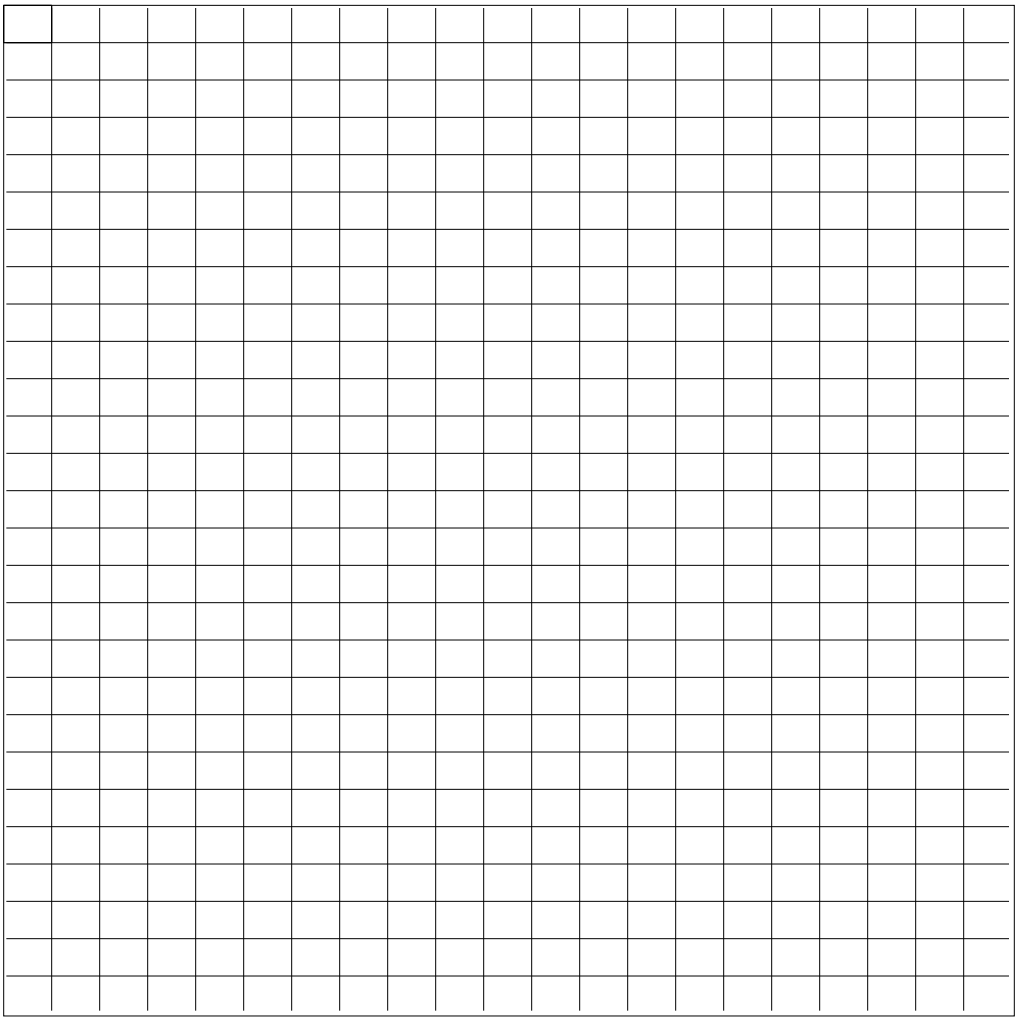
4. This number is usually expressed in the form of a scale on drawings. For example, the scale for the number 9 would be: *Scale : 9 yards = 1 unit* What is the scale for this drawing _____

5. Complete the following table using the scale chosen.

MEASUREMENTS	ACTUAL(yards)	SCALE (units)
Length of field	100	
Width of field	60	
Width of goal	8	
Length of goalie box	24	
Width of goalie box	18	
Radius of corner circles	1	
Radius of midfield circle	10	

Worksheet 3 -Continued
Scale Drawing of Soccer Field

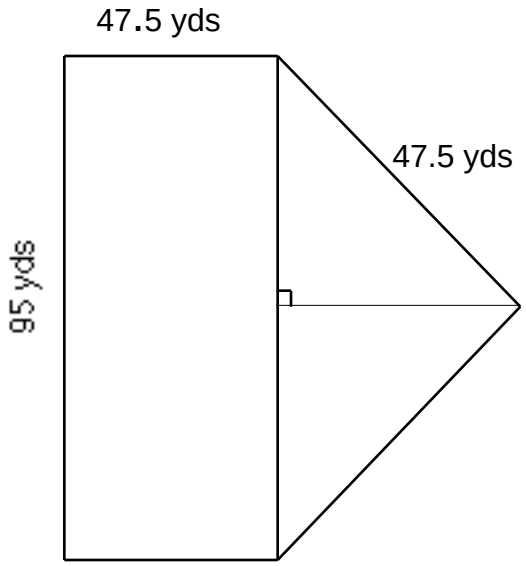
Using the scale measurements calculated in the previous table, construct a scale drawing of the proposed soccer field. Be sure to center the drawing on the grid with appropriate margins. Also keep in mind that some simple calculations will need to be performed in order to center the goalie box, goal, and midfield circle on the field. Use the drawing on worksheet 2 as a guide.



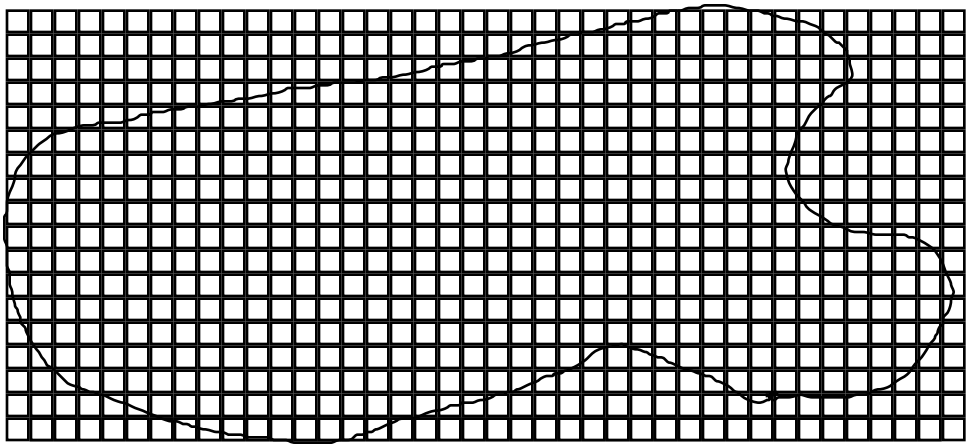
SCALE : _____

Worksheet 4
Choosing a Soccer Field

A)

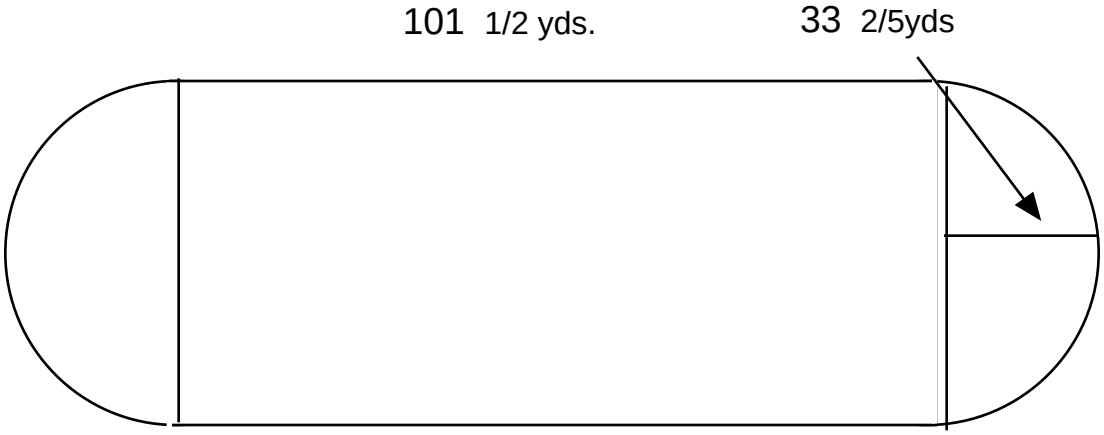


B)



□ = 9 sq. yds.

C)



Worksheet 4 - Continued
Choosing a Soccer Field

ACTIVITY 1:

Find the area of each irregular shape. Show all work.

A) Work space Area= _____

B) Work space Area= _____

C) Work space Area= _____

ACTIVITY 2:

A) Given the dimensions of 100yds. long and 60yds. wide, which field(s) could be used for a soccer field? Explain your choice(s).

B) Explain why you did not choose the other(s).

Culminating Activity
Proposal

Directions: You now need to make a proposal to the School Board for your soccer field. Include the following information in the same order as follows:

1) A business letter explaining the purpose of your project, total expenses, and what worksheets will be included.

2) Worksheet # 1

3) Worksheet # 2

4) Worksheet # 3

5) Worksheet # 4

NOTE: Included in this proposal, at least one worksheet must come from each member of the group.

All forms must be displayed in a clear folder with a cover page.

Proposal Form

Proposal No:_____
Date:_____

Proposal submitted to:

Name:_____
Address:_____
_____
_____
Phone number: (__)_____

Work to be performed at:
Address:_____
_____
_____
Date of Plans:_____
Contractor:_____

We hereby propose to:

All material to be as specified and the above work to be performed in accordance with the drawings and specifications submitted for above work and completed in a substantial workmanlike manner in the sum of:_____
_____Dollars ($_____).

Respectfully submitted,
_____
_____
_____
_____

ACCEPTANCE OF PROPOSAL

Signature:_____

Printed Signature:_____
Date:_____

Extension Activity 1
Soccer Assessment

Your proposal for a soccer field was so successful that the School Board has requested that you submit a new proposal to include the cost of growing grass for a soccer field for new school sites**.**

You have researched the following information:

- Kentucky bluegrass sod already grown is sold in 5 sq. ft. patches for $1.59 each patch.
- Kentucky bluegrass grass seed is sold in 20 lb. bags for $21.00 a bag and covers 5000 sq. ft. This grass takes 20 days to grow.
- Fescue grass seed costs $37.00 for 20 lb. bags and covers 5000 sq. ft. This grass is slow growing and more drought resistant.

Find the cost of each grass option for covering the soccer field which measures 100 yds. x 60 yds. Show all work. Choose the most feasible option for this project.

Kentucky Bluegrass Sod	Kentucky Bluegrass Seed	Fescue Seed

Scoring Rubric
What Does It Take To Field A Soccer Team?

Score Point 4
Each student participated equally in the group.
Students showed clear understanding of presented data and used it appropriately.
Students stayed within budgetary constraints.
Students made accurate calculations.
Students accurately transferred a calculated scale to a drawing.
Students wrote a clear business letter containing specific details.

Score Point 3
Each student participated equally in the group.
Students showed clear understanding of presented data and used it appropriately.
Students deviated slightly from budgetary constraints.
Students made accurate calculations.
Students accurately transferred a calculated scale to a drawing.
Students wrote a clear business letter containing some details.

Score Point 2
Students often were unclear on following directions.
Students showed clear understanding of presented data and used it appropriately.
Students excessively deviated from the budget.
Students used geometric formulas and mathematical calculations, not all of which were correct.
Students were not able to accurately transfer a calculated scale to a drawing.
Students did not include all items in the business letter .

Score Point 1
Each student did not contribute.
Students often were unclear on following directions.
Students showed clear understanding of presented data and used it appropriately.
Students did not use the given budget.
Students used incorrect formulas and miscalculations.
Students were not able to transfer a calculated scale to a drawing.
Students did not include all items in the business letter .

Score Point 0
Student did not hand in a project.
Students did not complete worksheets.
Students did not work in their group.
Students did not write a business letter.
Formulas and calculations were not related to the problems.
Project was unscorable.